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spectorama



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# *spectorama canada at the IEEE*

Institute of Electrical and Electronics Engineers Conference and Exhibition

**Stand M1-24**

**Coliseum, New York**

**March 20 to 23, 1967**

*spectorama electronics*





Imagination, yes! To introduce you to the scope and excellence of Canadian achievements and advances in electronics—pointing pathways to greater profit.

**Canada:** Your closest friend, your best customer.

**Canada:** Satellite builder. Avionics innovator. Fluidics pioneer. Nucleonics specialist. World leader in single sideband radio design and development . . . in long-distance microwave communications . . . EHV power transmission, too.

One of your nation's most significant partners in aerospace developments, missile systems and satellite communications.

Proof? You'll find it in the Canadian Exhibit, Stand M1-24. Here are products that sell themselves—and solutions to pressing problems. Discuss them with our specialists there.

And if you've a special design need, they're ready with engineering expertise, imaginativeness and inventiveness par excellence in your field.

THEY are *Spectorama Canada* . . .  
Spectorama Electronics!



Represented by:

*The Jack Miller Company  
1 Continental Avenue  
Forest Hills 75, New York  
Tel: 263-4446 (Area Code 212)*

*Wm. M. Jones Co. Inc.  
P.O. Box 6880  
Towson 4, Maryland  
Tel: 823-5721 (Area Code 301)*

# spectorama

## constanta

The Constanta Co. of Canada Limited – a specialty firm with quality products – is featuring *high-stability deposit carbon film and metal film resistors* at IEEE. Constanta entered the United States market in a small way in 1959 and now exports 60 per cent of its total production.

All Constanta resistors are developed and manufactured to meet military requirements and those of commercial precision instrumentation.

The company has new resistors with improved characteristics and is displaying a range of precision metal and carbon film resistors in 12 sizes to potential buyers.

The cracked carbon resistors, with their fine homogeneous film, give lower noise and improved stability. The metal film resistors have a low temperature coefficient and are designed to meet military specifications – and in many instances, surpass them.

Constanta coats precision resistance elements with an exclusive epoxy. They are finished with paint or molded in a high temperature thermosetting plastic or hermetically sealed in ceramic sleeves.

Resistors from this Canadian company are used successfully in space projects, research programs and in varied precision communications equipment.

Advanced manufacturing techniques produce any resistance from 0.6 ohm to 1,000 megohms with close tolerance. Special values of various sizes can be made to meet individual needs. Special resistors with different mechanical mounting, various shapes, sizes and resistive networks can be manufactured using the latest high-vacuum deposition techniques.

Constanta gives price quotations to United States buyers in U.S. dollars. The company's freight policy is flexible, depending on the size of the order.

### **The Constanta Co. of Canada Limited**

280 Regina Avenue  
Montreal 19, Quebec, Canada  
Tel: 768-3235 (Area Code 514)



# spectorama

## general precision industries

A young specialist company, General Precision Industries Limited is the offspring of Beaconing Optical and Precision Materials Company Limited of Montreal. General Precision was established just 10 years ago primarily to *design and develop military direction finding equipment*. GPI has its own large, well-equipped laboratory and uses the engineering and manufacturing facilities of the older company.

They are fast workers at GPI—many major development projects have been undertaken successfully for both the United States and Canadian governments since the company was formed. A crash program under the joint sponsorship of these countries resulted in the delivery of the first production unit of a complex receiving set (AN/FRR-68) just 24 months from the start of initial development work.

Fast-growing GPI can handle similar equipment projects and experts are at IEEE to demonstrate the company's ability to design equipment which will meet individual customer requirements.

On display is the *radio receiving set AN/FRR-68* developed for the United States Air Force and since produced in quantity for other U.S. organizations.

This set intercepts signals within the high frequency range. The signal's frequency is shown on a digital display and there are outputs to local and/or remote data handling equipment. The set is for ground use.

Also exhibited is the *HF direction finder AN/SRD-501* designed for the Royal Canadian Navy. This set determines the direction of arrival of a radio signal in the medium and high frequency ranges. It is for shipboard use.

A compact, 50-pound antenna array of the Bellini-Tosi type, mounted on a collapsible or fixed mast, was specially developed for use with the AN/SRD-501 receiver. Other antenna arrays operating as a sine/cosine resolver (Adcock type) can be used.

More details about these and other GPI equipment can be obtained from the company's chief engineer at the exhibit.

Unless otherwise requested by the customer it is General Precision's practice to quote United States shipments in U.S. dollars, f.o.b. plant in Granby, Quebec.

### **General Precision Industries Limited**

455 Craig Street West  
Montreal 1, Quebec, Canada  
Tel: 866-8395 (Area Code 514)



# spectorama

**hargrave**

Electronic instruments from Hargrave Applied Research Corp. Ltd. are making a significant contribution to diagnostic medicine. At present the company's products are used in hospitals in the United States, Italy and the West Indies.

Among the company's instruments displayed are a *pulse-meter*, *blood pressure monitor*, a combination *pulse and blood pressure monitor*, an *E.C.G. activated cardiac monitor* and a *fetal heart monitor*. All provide visual and aural records of such vital signs as pulse rate and rhythm as well as blood pressure during treatment, surgery and recovery.

Easily carried, these all-transistorized instruments operate on small rechargeable batteries which eliminate explosive or electrical hazards. Aural signals can be heard on remote speakers permitting monitoring at nurses' stations.

The fetal heart monitor — winner of two National Design Council of Canada awards — keeps track of fetal heart functions late in the gestation period and during labor. By means of a transducer composed of three sensitive microphones attached to a surgical belt placed around an expectant mother's abdomen, the fetal heart beat can be monitored constantly for changes in rate or rhythm indicating possible complications during pregnancy or childbirth.

With a small transducer attached to the patient's thumb, forefinger, toe or on the carotid artery the Hargrave pulse-meter provides continuous visual and aural records of the peripheral pulse in the extremities or vital arteries. The company's larger transducer will monitor a patient's heart beat. The pulse-meter can also be used to determine systolic blood pressure. The company's semi-automatic blood pressure monitor records systolic and diastolic blood pressure.

Hargrave's portable E.C.G. activated cardiac monitor — virtually artifact free — is ideally suited for continuous monitoring of the rate and rhythm of cardiac activity in premature infants and restless patients. The company is also showing its economical fetal E.C.G. preamplifier which detects fetal life when used with any standard E.C.G. recorder.

In addition, the firm is introducing an electronically operated drop counter and rate meter that provides audible and visual indications of the rate of intravenous infusions. Other Hargrave instruments under development include an *oximeter* for determining oxygen saturation of the blood, and a *PCO<sub>2</sub> meter* also used in blood gas analysis.

The company quotes prices in U.S. dollars, f.o.b. destination.

Represented by:  
Fraser Sweatman Inc.  
Township Line Road  
Hatfield, Pennsylvania  
Tel: 723-5525 (Area Code 215)

**Hargrave Applied Research Corp. Ltd.**  
180 Hargrave Street  
Winnipeg 1, Manitoba, Canada  
Tel: 942-8421 (Area Code 204)



**Represented by:**  
*Wild & Associates Inc.*  
200 Michael Drive  
Syosset, Long Island, New York  
Tel: 921-7100 (Area Code 516)

# spectorama

ferranti-packard

A highly respected name in the electrical industry for 73 years, Ferranti-Packard Electric Limited maintains some of the most advanced and complete research facilities in Canada.

With a long-established reputation for progressive leadership through research and development, the company produces a wide range of electrical and electronic products of sophisticated design and high quality for commercial, industrial and military applications.

Ferranti-Packard features *high-speed tape reader-spoolers* in its exhibit. The latest model, the type 4002-4003, has a variety of uses. It is available for input-to-digital computers, as a numerical control for machine tools, and for automatic testing and checkout equipment, automatic message transmission and industrial process control.

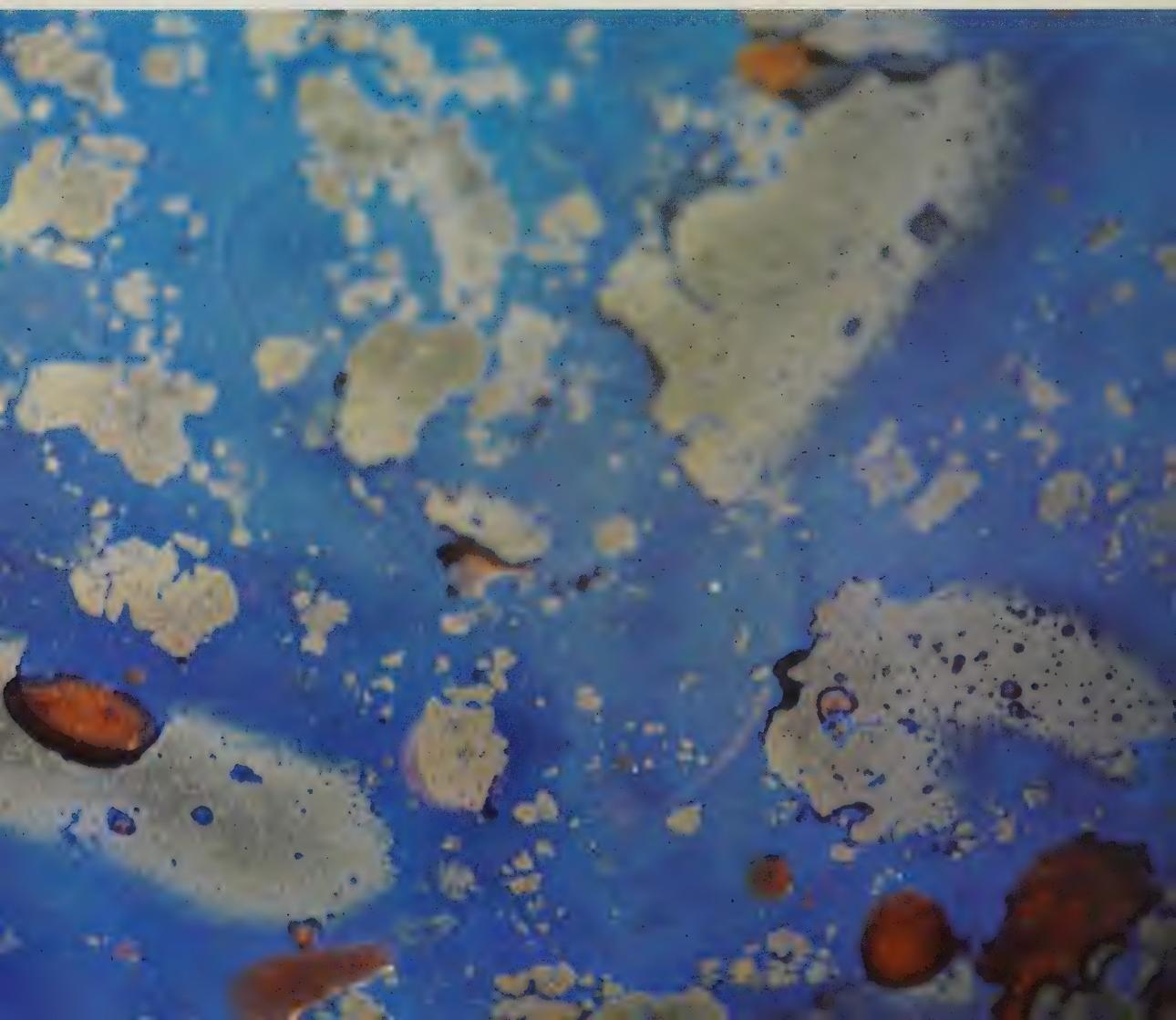
The free-run speed of the machine is 1,000 characters per second bi-directionally. An advanced disc-drive capstan allows the reader to stop before the next character at this speed while asynchronous stop-start operation is available at speeds up to 500 characters per second.

The disc-drive capstan and single pinch rollers also ensure complete accuracy on all thicknesses of punched tape since no adjustments are necessary when tape thicknesses are changed. Solid-state control circuits and signal amplifiers in the 4002-4003 reader are mounted on printed circuit cards located at the rear of the unit, readily accessible for test purposes. The photo-electric sense system uses nine reliable silicon solar cells and a regulated exciter lamp operating on a reduced voltage. Complete visibility of the tape is maintained for inspection or marking at the read station.

The latest design of a unique *information display system*, using the 4002/3 reader-spooler as the drive medium, is also being displayed. This trouble-free Ferranti display system is in use at the Montreal and Canadian Stock Exchanges in Montreal, Quebec, where the changing status of 400 stocks is continually displayed on boards 150 feet long by 12 feet high. A similar system is currently in production for the Chicago Board of Trade Commodity Exchange in Chicago, Illinois.

Ferranti-Packard representatives are on hand to give detailed information on the company's full range of products and take orders. Prices are quoted in U.S. dollars, f.o.b. destination.

**Ferranti-Packard Electric Limited**  
Electronics Division  
Industry Street  
Toronto 15, Ontario, Canada  
Tel: 762-3661 (Area Code 416)



# spectorama

## litton systems

Litton Systems (Canada) Limited was a small company when it was established in 1960 to produce specific airborne navigation systems for the Royal Canadian Air Force. The company expanded quickly, and now has a creative, skilled staff numbering 3,000.

Today Litton is a leading name in Canada's electronics industry, supplying a wide range of airborne equipment for military and commercial use and exporting 75 to 80 per cent of its production to the United States and Europe.

The company is displaying various models of its *inertial navigation systems* at IEEE. These lightweight units are self-contained, fully automatic, and give a continuous supply of basic information on an aircraft's velocity, position and altitude during flight. Key element in the systems is the Litton inertial platform which couples the inertial elements to the aircraft through a four-axis gimbal mechanism.

And Litton's Canadian-developed *mobile automatic test set (MATS)* performs complete and automatic checkout of the INS on flight-line or in a system of black box checkout at the base shop.

Litton is also showing its *air data computer*—an instrument which can be tailored to the individual needs of military, commercial and large private executive-type aircraft. It is a source of air data for lower minimum letdowns and for auto-pilot, naviga-

tion, engine control, in-flight recorder and other sub-systems. It is available for subsonic or supersonic flight.

Litton Systems (Canada) Limited is the only company making weapon release computer sets for use in the USAF's Phantom jet F4. This computer is another example of the company's capability in the production of high accuracy airborne instruments.

A departure from the company's usual products—and on show for the first time—is the Litton *blood coagulation timer*, which is expected to make a substantial contribution to medical electronics. The basic idea came from a doctor at Toronto General Hospital—Litton engineers developed it.

This instrument, by means of a separate photoelectric sensing device, automatically determines the whole blood clotting time for three individual sample tubes. It is more accurate than current methods of measurement and frees lab technicians and nurses for other duties.

The company's freight policy is flexible, depending on terms of contract.

**Litton Systems (Canada) Limited**  
25 Cityview Drive  
Rexdale (Toronto), Ontario, Canada  
Tel: 249-1231 (Area Code 416)



# spectorama

## hammond

Hammond Manufacturing Company Limited is not a mass production firm—it is a specialist company which designs and produces only *quality transformers for both the electronic and electrical industries*. Founded in 1927, Hammond has always placed great emphasis on service, flexibility and precision.

The company is particularly proud of its development of more than 100,000 special transformer and sheet metal designs to customer specifications—usually produced in runs of less than 5,000. Single phase transformers and saturable reactors to 150 kva and three phase devices to 250 kva are made by Hammond.

Two traditional lines of transformers are also stocked. One is for use in communications, industrial electronics and in the general repair and maintenance of electronic equipment. These vary in size from printed circuit midgets of a fraction of an ounce to large plate and power transformers of several hundred pounds. A second line of Hammond electrical transformers for industry ranges from small bell-ringing transformers of 25 va capacity to 45 kva three phase units for indoor distribution service.

High performance components for military use and aerospace research are other company specialties. Components are produced to MIL-T-27 requirements and evaluation tests are performed to specification.

For original equipment manufacturers, Hammond provides a single source for transformers and enclosures. The company handles metal fabrication projects of varying complexity in light structural steel, as well as sheet and plate materials up to a quarter of an inch thick. A large stock of special tooling is available. The fully integrated Hammond factory has shearing, punching, folding, welding and paint finishing facilities.

The representative group of Hammond components on display illustrates company capabilities.

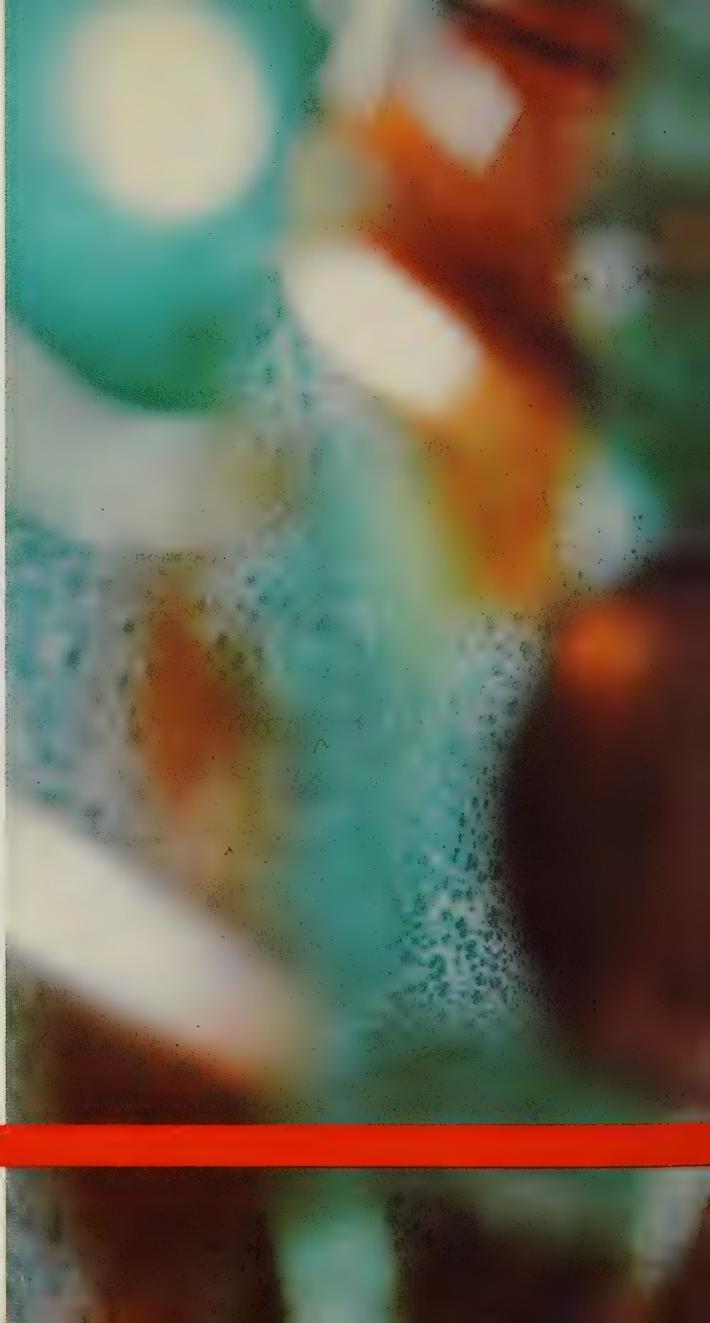
Hammond's freight policy is generally f.o.b. Guelph unless otherwise requested by the customer.

### Hammond Manufacturing Company Limited

394 Edinburgh Road North

Guelph, Ontario, Canada

Tel: 822-2960 (Area Code 519)



Represented by:  
Amphenol Sales Division  
310 Northern Boulevard  
Great Neck, L.I.  
New York, N.Y.  
Tel: 482-4700 (Area Code 516)

# spectorama

amphenol

Amphenol Canada Limited has developed a *micro-miniature filter-pin* which has better electrical and mechanical characteristics than any similar device on the market. It permits greatly improved RFI filtering.

This special pi-filtering technique has been achieved by combining the ferrite ceramic filter with a replaceable contact to form a filter-pin connector. Filtering within the confines of a miniature connector takes zero space (e.g. 30 pin-filter connector mated in less than  $\frac{1}{2}$  cubic inch) for maximum attenuation of electromagnetic induction in the 50 to 10,000 mc range.

The Amphenol filter-pin has another important feature – it prevents degradation of attenuation or isolation when contacts are inserted in groups in connectors, or after severe electrical, temperature and environmental stress. It also eliminates resonant inductance.

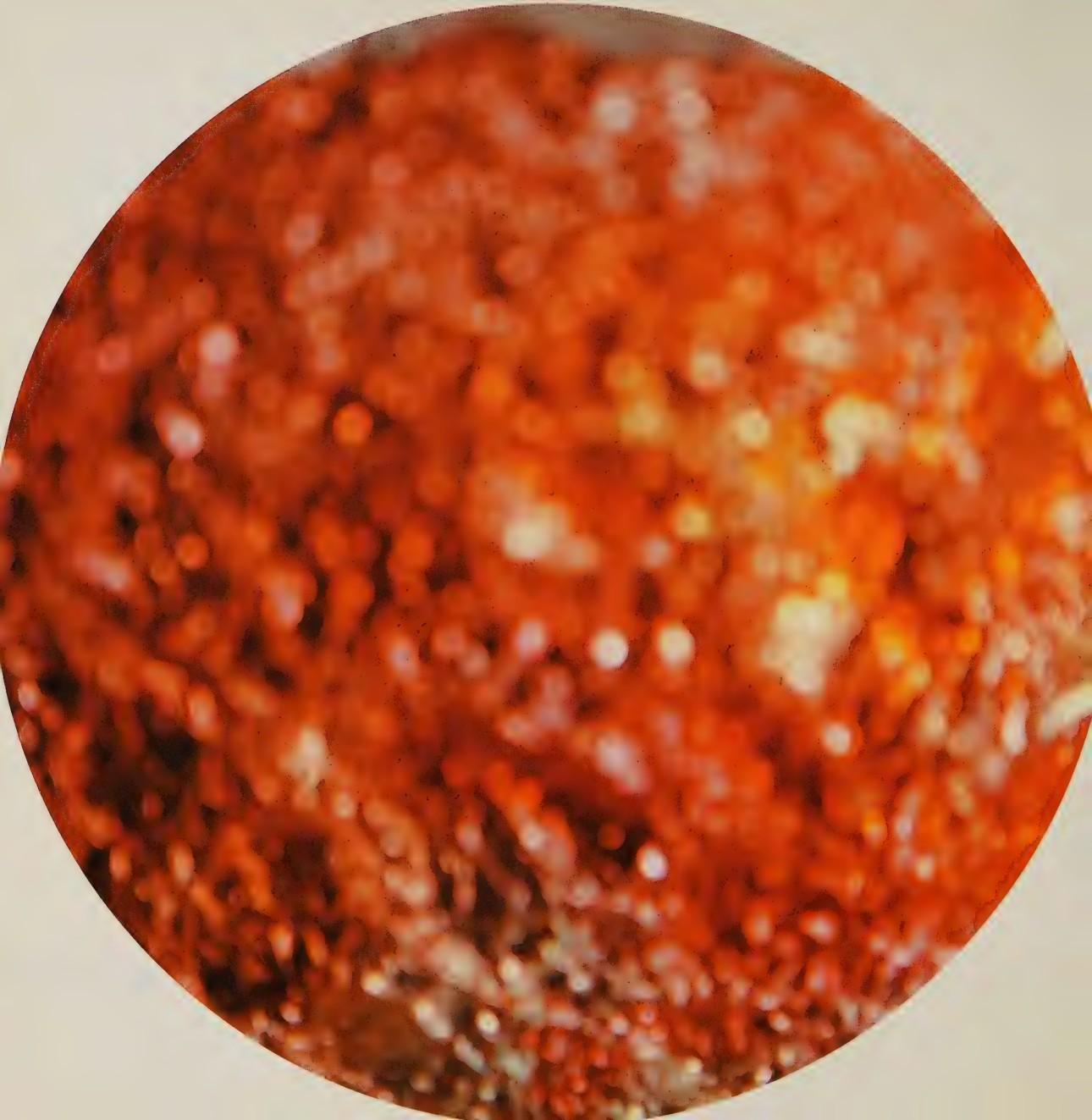
Used in airborne communications equipment, this device greatly reduces ignition noise and other barriers to intelligent and accurate telecommunications. In digital computers, it attenuates errors arising from RFI misinterpretations. Similarly, in research and operational missiles, it overcomes problems arising from RFI-induced errors in telemetered commands and messages to and from the ground station – these problems often result in failure or abortion of the firing.

Amphenol Canada is also displaying its 225 and 143 series *printed circuit connectors* each of which has a wide range of uses. The 225 series is designed for applications where anticipated printed circuit board insertions and withdrawals will exceed 500 cycles; for 500 cycles and below, the 143 series is recommended.

Amphenol Canada Limited, established in Toronto 13 years ago, has 29 overseas sales offices and representatives, and 24 in the United States. The company freight policy is f.o.b. Toronto plant – quotations in U.S. funds.

**Amphenol Canada Limited**

44 Metropolitan Road  
Scarborough (Toronto), Ontario, Canada  
Tel: 291-1695 (Area Code 416)



# spectorama

## polytronics

Polytronics Company designs and manufactures quality measurement and control instruments for industry and research. These include *decade resistance boxes, voltage dividers, wheatstone bridges, high-speed voltage stabilizers, temperature controllers of high accuracy and stability*, and other instruments made to the specifications of the American Society for Testing and Materials.

Among Polytronic products on display is the *Model 804 improved oil bath*, designed to meet the exacting requirements of ASTM kinematic viscosity test D 445-60 and D-2170. The unit may be used in any application requiring precise temperature control ranging from 80 to 300 degrees Fahrenheit.

Control is achieved by a temperature-sensitive ac bridge circuit with a resistance thermometer in one arm which senses the bath temperature. This signal is then amplified and applied to silicon-controlled rectifiers. These supply current to a magnetic amplifier to control the heating element's power supply.

As the oil bath is fully automatic in operation, few controls are needed, the most vital being a 10-turn helical potentiometer. This provides the very fine adjustment needed to keep bath temperature within plus or minus .05 degree Fahrenheit or specified value—as required in the ASTM test. The absence of dc amplifiers contributes to the unit's stability, and the elimination of vacuum tubes and of all moving parts, including relays and variable transformers, gives it excellent long-term reliability.

*Resistance thermometers* by Polytronics incorporate a unique design feature which gives high-speed response and full protection to the delicate wire used in the instruments. Wolfram (tungsten) wire with a resistance of 100 ohms at 25 degrees centigrade is generally used in Polytronics thermometers but platinum, copper, nickel and other materials may be specified. Lengths are usually made to order.

Experts are on hand at the Polytronics exhibit to give buyers more detailed information on the company's full range of products. Prices are generally quoted in Canadian funds, f.o.b. Toronto.

### **Polytronics Company**

582 Bathurst Street  
Toronto 4, Ontario, Canada  
Tel: 921-8767 (Area Code 416)



# spectorama

## electrical

Electrical Mfg. Co. Ltd., founded in 1924, specializes in the design and manufacture of *medium and low-voltage distribution equipment*.

Its products, sold under the Montel trade-mark, range from the smallest lighting panel to the largest high-voltage substation installations and are well known throughout the world for their outstanding quality. The company is also famous for its specialties.

Installations have included high-voltage and distribution substations at Frobisher Bay in the Arctic and an assembly of distribution equipment for a nuclear power plant at Trombay, India.

Among new developments by Electrical Mfg. is a type of *high-intensity punctual disconnect*. This has silver points with a rated capacity up to 12,000 amps. Disconnects of this type are at present in service in the Hydro-Quebec power network and the Aluminum Company of Canada distribution system.

The company also recently designed a *4,000-amp, 750-volt dc load make switch*—motor-operated—for the Montreal Metro subway system.

In switchboards, Electrical Mfg. has designed and manufactured control panels which are used in the 735-kv line recently installed in the Hydro-Quebec power system between Manicouagan and Levis, Quebec. This is the highest utilized voltage to date for power transmission.

Other products made by Electrical Mfg. include busways, control desks and boards, motor control centers, high-tension fuses, air circuit breakers, voltage indicators, ground detectors, wire-ways, dimmer boards, outdoor load break switches and entrance boards.

The company's freight policy is f.o.b. factory or destination in accordance with customer requirements.

### Electrical Mfg. Co. Ltd.

P.O. Box 130

Montmagny, Quebec, Canada

Tel: 248-0235 (Area Code 418)



Represented by:

Charles S. Steacy  
109 Hendrickson  
Edgewater Park, New Jersey  
Tel: 877-9055 (Area Code 609)

# spectorama

e.m.i.-cossor

E.M.I.-Cossor Electronics Ltd. is one of Canada's best known leaders in the development and manufacture of *underwater electronic devices*. A consistently progressive firm it has the scope and versatility to produce complex equipment for today's defense and commercial electronic systems.

E.M.I.-Cossor is at IEEE to show representatives of important industrial and research centers in this area what it has accomplished for some — what it can do for others.

The company is displaying part of the equipment which it is producing for the United States Navy: *common user radio transmission system (CURTS)*. A standard *ionospheric sounder, Model 8000*, and *precision deflection yokes and coils* are also shown.

The HF sounding receiver for CURTS sweeps through 80 frequencies in synchronism with the transmitter. One receiver can be used with up to 10 transmitters. CURTS equipment operates in a stationary role or it can go mobile. The receiver's low weight and power consumption make it easily transportable.

The company introduced its Model 8000 Ionosonde in 1965 — and shattered established concepts of ionospheric measurement. Since solid-state circuitry is used wherever possible in its

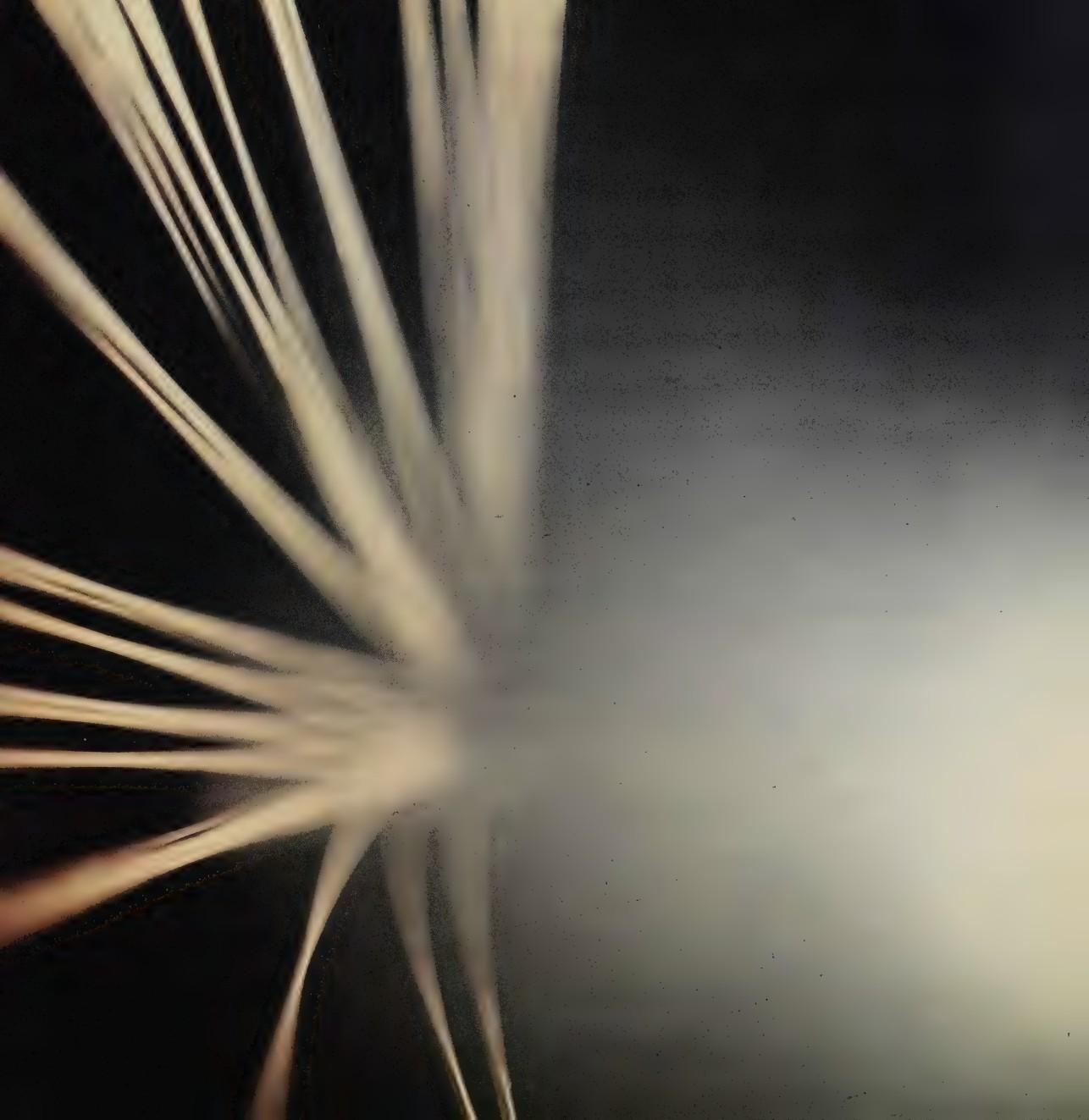
design, this vertical/oblique sounding terminal equipment can be carried around and operated by one person.

E.M.I.-Cossor designs and manufactures precision deflection yokes for transistor drive, extra wide angle deflection with p.m. correction, dynamic focusing systems and compound or dual-deflection systems.

The E.M.I.-Cossor representative has detailed knowledge of equipment shown and of the wide range of other company products. These include direction-finding systems, antennas of all types, ECM and ECCM equipment, audio, public address and intercom systems and industrial electronic instrumentation.

The company gives quotations f.o.b. plant, Dartmouth, Nova Scotia and exports to the United States, Britain, France, The Netherlands, Denmark, Sweden, Norway, Australia and India.

**E.M.I.-Cossor Electronics Ltd.**  
P.O. Box 1005  
Dartmouth, Nova Scotia, Canada  
Tel: 466-7491 (Area Code 902)



# spectorama

aviation electric

A major breakthrough in fluidics, the result of an aggressive research and development program, highlights recent progress by Aviation Electric Limited which will have *four new fluidic logic elements* on display at IEEE. By using a unique vortex venting technique the new elements eliminate the impedance matching problems normally associated with the inter-connection of fluidic devices.

The first Canadian company to undertake extensive work in this field, Aviation Electric is now marketing *monostable, bistable and proportional amplifiers and a fluid state diode*.

The monostable and bistable logic elements operate in the 1-15 psig input pressure range. They can withstand variations in output leg loading from fully open to completely blocked without false switching or change in operating characteristics. They also allow reverse flows in the inactive leg without "loss of memory".

Pressure recovery ratio in the fully blocked condition is in excess of 40 per cent and the flow recovery ratio in the wide-open condition is about 110 per cent (more than 100 per cent because the fluid is entrained by the vortex venting action). Switching time is approximately .0004 second while switching pressure is less than 15 per cent of the power jet pressure.

The fluidic diode has a reverse flow ratio of less than 4 per cent. It has particular application as an insert in the connecting lines of existing fluidic systems to overcome troublesome load matching problems.

These unique devices have been exhaustively tested and several control systems for industrial applications have been designed and breadboarded using the bistable and monostable elements.

A general purpose *fluidic sequence controller* is an example of industrially-oriented applications now being investigated. This controller will actuate a number of separate pneumatic cylinders in a timed sequence. The cost is expected to be about two-thirds that of conventional electronic or pneumatic control equipment.

An *opti-electronic guidance control system* has been produced by AEL for the Martlet IV space vehicle used in the Canadian-developed High Altitude Research Project (HARP) and testing has been carried out on a fluidic pitch and yaw control for missiles.

The company's surface navigation system has been adopted by the armed forces of Britain and Canada and is undergoing extensive evaluation tests in other NATO countries.

**Aviation Electric Limited**  
200 Laurentian Boulevard  
Montreal 9, Quebec, Canada  
Tel: 744-2811 (Area Code 514)



# spectorama

## barringer research

Barringer Research Limited, specializing in the design, development and application of new instruments and techniques for geophysical and geochemical exploration, is attending IEEE to demonstrate its latest products.

The firm is featuring a model of its recently developed *passive correlation spectrometer* which detects trace quantities of gases – at ranges of one mile or more by using natural radiation from the sun – without physical contact with the gas. A telescopic system collects light from a distant source and passes it through an optical system that analyzes the light and detects – at very high sensitivity – the presence of specific complex spectral distributions.

During recent air pollution tests at a number of North American centers, this instrument proved highly successful in determining the amount of sulphur dioxide emitted by a variety of industrial plants. A similar system is being constructed for the National Aeronautics and Space Administration for use in the Apollo Program. It is planned to monitor the distribution of air pollution from earth orbit and to seek the presence of volcanic activity on the moon by detecting volcanic emissions from lunar orbit.

Barringer is also displaying the *SM103, a lightweight direct-reading magnetometer* designed specifically for ground or oceanographic application. As a ground instrument, the unit is ideally suited to determining diurnal variation of the earth's magnetic field. The SM103 will operate for more than a month from ordinary automobile batteries and will record up to a month's data on either magnetic tape or a strip chart recorder.

Another product from Barringer is the *MS-700 low gradient magnetic field generator* which provides an essentially spherical uniform magnetic field with a gradient of 1 gamma per lineal foot within a large volume. This device provides approximately 120 cubic feet of volume for the calibration and testing of magnetic instruments or for determining residual magnetism on massive structures to be used in space applications.

Barringer's freight policy and price quotations are made according to customer requirements.

**Barringer Research Limited**  
304 Carlingview Drive  
Rexdale, Ontario, Canada  
Tel: 677-2491 (Area Code 416)



**Represented by:**  
*D. & R. Associates  
248 Lorraine Avenue  
Upper Montclair  
New Jersey 07043  
Tel: 744-8378 (Area Code 201)*

# spectorama

cramco

Cramco Solder Alloys, a highly progressive firm which can produce *solders* and *fluxes* to meet any soldering requirement, is at IEEE to demonstrate its specialist approach and capabilities in both the electrical and electronic fields of industry.

The growing demand for automation and mass production has increased the need for predetermined amounts of solder produced in different sizes, shapes and alloys. The company markets solder forms in *coils*, *rings*, *washers* and other limitless shapes and sizes to individual specifications.

Now Cramco has introduced *spheres* and *balls*—with size control to plus or minus .002" — in the normal tin/alloy of 99.999 per cent purity, solder alloys containing indium and other precious metal alloys. Although these spheres and balls cannot be supplied with a flux core all other company products are manufactured with ER99, OC55 or AC66 fluxes to customer requirements.

One Cramco product which required extensive research is SC-77 cored solder for the safe removal of difficult stainless steel oxides. Previously the soldering of stainless steel has required an external, highly corrosive flux, fairly dangerous to use. SC-77 is excellent for soldering ni-chrome wire and has many other applications.

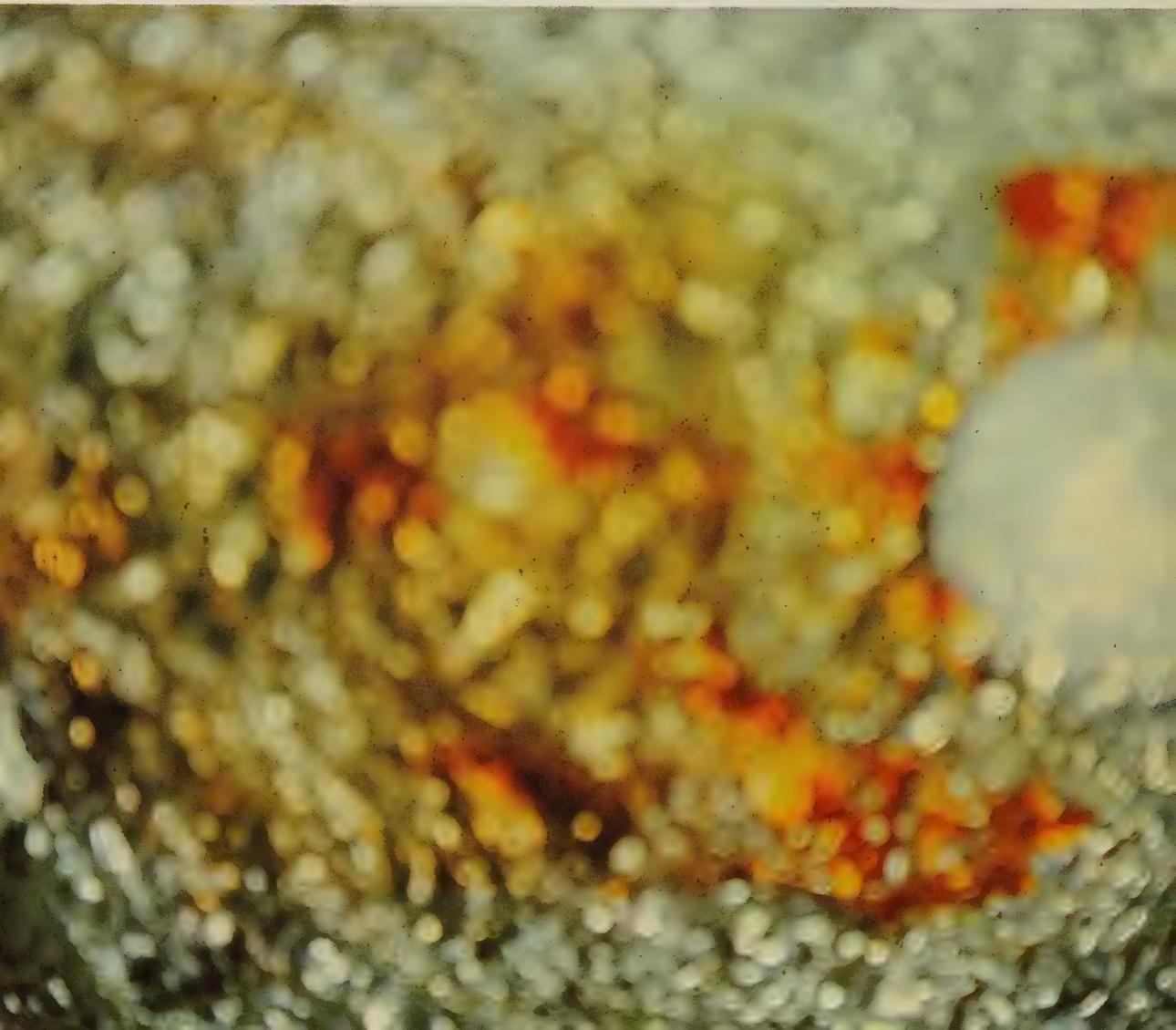
Cramco has given nature an assist with its ER-99 rosin core solder. Rosin's residual form is electrically non-conductive and non-corrosive under long tests of time and adverse atmospheric conditions, but rosin is not an active remover of oxide. Cramco has added energy in a form which does not affect the natural characteristic of pure rosin. This means that ER-99 meets modern production requirements, decomposes rapidly at soldering temperatures, leaving an inert substance encapsulated in pure rosin.

ER-99 flux core competently solders on a production basis such things as nickel plate, electro tinned steel, copper, brass and moderately oxidized copper. No preparation of the surface to be soldered is needed. This solder is widely used in television, radio, computer and telephone production assembly and for transformers, coils, tubes, diodes, condensers, capacitors and other electrical and electronic component parts.

Cramco offers its wide range of solder alloys to United States buyers duty paid, overnight delivery to most areas, with minimal paper work for the buyer and excellent payment terms.

## Cramco Solder Alloys

Division of Cramco Alloy Sales Limited  
80 Sinnott Road  
Scarborough, Ontario, Canada  
Tel: 757-2876 (Area Code 416)



# spectorama

de havilland

Paving the way in ground and space communications is the Special Products and Applied Research (SPAR) Division of The de Havilland Aircraft of Canada, Limited. Its capabilities encompass a wide range of products and services in the electronics, optics and dynamics areas.

SPAR Division is drawing attention here to its technical proficiency in the power conversion and electro-optical fields and emphasizing one of its most successful achievements — *the aerospace and ground STEM (Storable Tubular Extendible Member) device*.

The extendible/retractable units were designed for space applications as antennas or instrumentation booms. They proved their worth in Canada's first satellite — Alouette I — and have been installed in many U.S. manned and unmanned spacecraft. The company offers a wide range of STEM equipment which includes transportable units for use on the ground as antennas or mechanical booms. Fire and police departments, emergency measures organizations, forestry and geological surveys are a few examples where STEM can be employed.

The storage and deployment principle of the extendible antenna was conceived at Canada's National Research Council and developed by de Havilland's SPAR Division to the satellite design requirements of the Defence Research Telecommunications Establishment.

STEM consists of a very thin metal tape wound on a drum and the tape has been specially heat-treated to assume a tubular shape when unrestrained. When the antenna extension is required, the tape rolls off the motor-driven drum and is allowed to assume the tubular shape with an overlap of 180 degrees. On retraction, a guidance system flattens the tape for storage.

A variety of STEM masts and antennas is available including a vehicular mast, a new self-ejecting automatic "jack-in-the-box" unit, and aerospace high frequency whip antennas. Other products on display are a *solid-state electrical power inverter* and a *Mark 7 instrumentation camera* for aerial photography, radar and oscilloscope recording and record plotting.

Most of the Division's products are air shipped to U.S. buyers or delivered by hand.

**The de Havilland Aircraft of Canada, Limited**  
Special Products and Applied Research Division  
Malton, Ontario, Canada  
Tel: 676-3245 (Area Code 416)



## INFORMATION

Officials of the Canadian Department of Trade and Commerce and representatives of participating firms in the Institute of Electrical and Electronics Engineers Conference and Exhibition at New York will be pleased to answer inquiries. Information is also available from the following Canadian trade offices in the United States.

### NEW YORK

Deputy Consul General (Commercial)  
Canadian Consulate General  
680 Fifth Avenue  
New York City, N.Y. 10019  
Tel: JUDson 6-2400 (Area Code 212)

### BOSTON

Consul and Senior Trade Commissioner  
Canadian Consulate General  
500 Boylston Street  
Boston, Massachusetts 02116  
Tel: 262-3760 (Area Code 617)

### CHICAGO

Consul and Senior Trade Commissioner  
Canadian Consulate General  
Suite 2000  
310 South Michigan Avenue  
Chicago, Illinois 60604  
Tel: 427-1031 (Area Code 312)

### CLEVELAND

Consul and Senior Trade Commissioner  
Canadian Consulate  
Illuminating Building  
55 Public Square  
Cleveland, Ohio 44113  
Tel: 861-1660 (Area Code 216)

### DETROIT

Consul and Trade Commissioner  
Canadian Consulate  
1920 First Federal Building  
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Tel: WOODward 5-2811 (Area Code 313)

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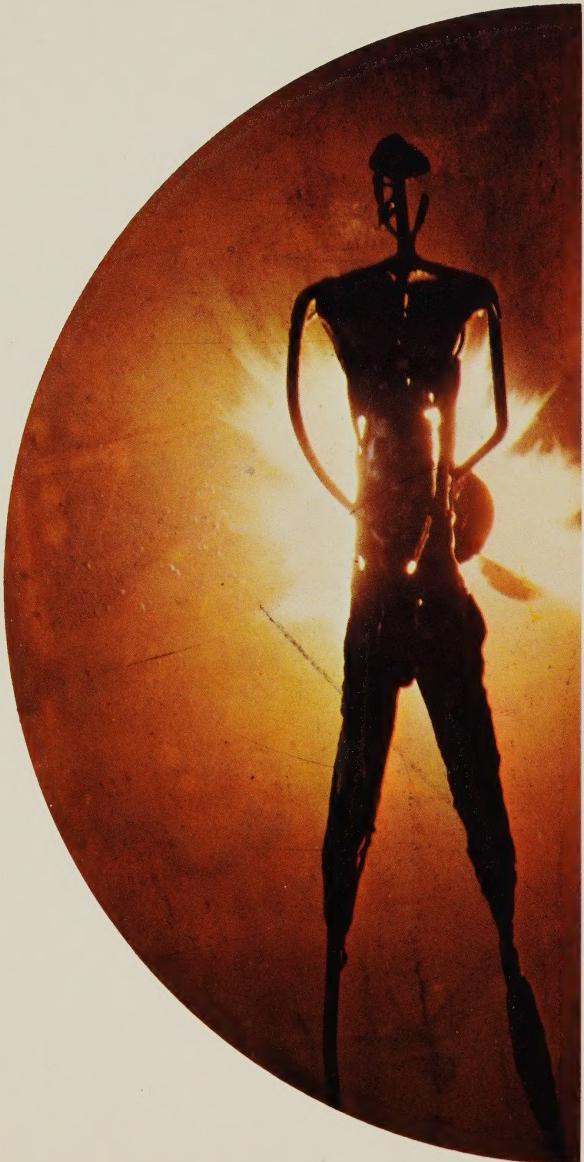
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